

**PALM BEACH HARBOR MAINTENANCE DREDGING
PALM BEACH COUNTY
PERMIT NO. 0216012-001-JC
SEDIMENT QUALITY CONTROL / QUALITY ASSURANCE PLAN**

July 2006



I. Introduction and Background

This submission by the U. S. Army Corps of Engineers (“the Corps”) is intended to serve as the detailed Sediment Quality Control/Quality Assurance Plan required by Rule 62B-41.008(1)(k)4.b., F.A.C. The plan addresses the sand currently present on the beach, as well as the material within the identified areas to be dredged within the authorized Federal Channel of Palm Beach Harbor.

A set of specifications on the sediments and other geotechnical information were provided during the application process for the permit and are generally available upon request. The permit was issued on March 17, 2005 for a ten year time period. Based on the sediment information provided, it was determined that all material from the entrance channels (Station 0+00 Cut 1 to Station 87+92 Cut 2) was suitable for nearshore and/or beach placement and that all material dredged from the turning basin (Station 87+92 Cut 2 to Station 19+50 Turning Basin) was only suitable for nearshore and/or ocean placement. The sediment quality specifications take into account the consistency of material within the proposed area to be dredged and represent values which may reasonably be attained given what is known about the dredge area material. The entrance channels and turning basin at Palm Beach Harbor are generally dredged at least once per year, providing continual confirmation on sediment characteristics. In addition to the sediment quality specifications, an overview of required project inspection and reporting is provided.

The goal of this plan is to assure that the sand placed on the beach complies with all applicable standards. Additionally, this plan enables the project to provide a beneficial use of dredged material by serving in an inlet-bypass capacity for sand that would have otherwise proceeded in the natural littoral drift of the coastal system adjacent to the inlet.

In addition to the specific quality control requirements contained herein, the Corps’ Quality Assurance Representative (QAR) or Area Engineer/Contracting Officer Representative (COR) and Contractor will periodically examine the beach during construction with the specific intent of assessing whether in fact the sand placed on the beach is acceptable. These observations would be conducted on a daily basis and reported in the daily turbidity reports, which are submitted on a weekly basis. Material to be placed in the nearshore (turning basin material) has already been analyzed and will be monitored daily through the turbidity monitoring protocol. During the pre-construction meeting, the COR will emphasize the importance of sound sand quality control management and the necessity to avoid problems in the execution of the measures in this plan.

II. DEP Sand Rule—Preconstruction Compliance

A. FDEP Sand Rule

Permits for this project require that only beach-compatible fill shall be placed on the beach. Standards of compatibility are defined by the Department of Environmental Protection "Rules and Procedures for Application for Coastal Construction Permits" Chapter 62B-41.007(2) j. These rules and procedures are otherwise known as the "Sand Rule" and can be found on page 5 of this plan and as of June 2006 on the DEP website:

<http://www.dep.state.fl.us/legal/Rules/beach/62b-41.pdf>

The Corps recognizes these rules and procedures as a standard of acceptance by which the fill material from dredge areas should be assessed.

B. Existing Beach Sands

In general, nearshore placement of material has benefited the existing beach placement area by routinely receiving dredged material from the entrance channel of Palm Beach (material coming from the beaches located north of the inlet create shoal conditions in the channel). The template fill placed within the construction boundaries should be consistent in character with the existing beach, as has historically been the case and historical observations provide confirmation of the process. In order to verify the character of sand within the placement area, the contractor and Corps of Engineers (COE) personnel shall continually observe the placement activities to ensure that the dredged material is acceptable for beach placement. These observations would be conducted on a daily basis and reported in the daily turbidity reports, which are submitted on a weekly basis. Material to be placed in the nearshore (turning basin material) has already been analyzed and will be monitored daily through the turbidity monitoring protocol.

C. Maintenance Dredging Material

Clusters of historical core boring logs and grab samples from the area (collected for previous dredging events) indicate that the source materials from the entrance channels and turning basin have shown consistent sediment characteristics and range between fine sands(turning basin) to coarse sands (entrance channels), with some shell. When appropriate in the future when the quality of material may be questioned the material would be analyzed so that a sieve data sheet would be included when performing and reporting sieve analyses. This would include the following in tabular form: 1) sieve number, 2) diameter in mm, 3) diameter in phi units, 4) weight retained on sieve, 5) weight percent retained on sieve, 6) cumulative weight retained on sieve, 7) cumulative weight percent retained on sieve. All weights and percentages would be recorded to the nearest 0.01 gm. See additional information below:

- 1. Sampling Methodology** - Grab samples would be collected by the Corps using a standard ponar (or other suitable device) within the project's prospective

dredging areas. At a minimum, sampling locations would be located at approximately 1000 foot intervals.

2. Laboratory Analyses - Each sample would be characterized as to sand-type, moist color (Munsell), grain size distribution (sand grain frequency, median grain size, mean grain size, sorting coefficient), % shell, % fines (retained on #230 sieve), % fine gravel (retained on the #4 sieve), % coarse gravel, cobbles or material (retained on the 3/4 inch sieve). Sample granularmetrics would be quantified by performing a gradation analysis using nested sieves based upon ASTM D 422. Required U.S. Standard sieve sizes shall include 3/4", 3/8", 4, 7, 10, 14, 18, 25, 35, 45, 60, 80, 120, 170, 200, and 230.

3. Recording and Reporting of Results - The results of each sample analysis would be submitted as follows: (a) a tabular summary of % shell, % fines, % fine gravel, % coarse gravel, % cobbles or other material (retained on the 3/4 inch sieve), Munsell color (moist sample), and presence of construction debris or other foreign matter; (b) grain-size cumulative frequency distribution curve (a.k.a. gradation curve), and (c) tabular summary of nested sieve sample granularmetrics including mean grain size, median grain size, and sorting expressed as a numeric and verbal value. The sample submittal date to the laboratory would be recorded by the laboratory on all reporting documents.

D. Outcome and Action - If an examination by the Corps of the pre-construction sediment analytical data or historical geotechnical data reveals the likelihood of non-compliant material being placed on the beach or nearshore area, other disposal or beach remediation alternatives may be pursued by the Corps in consultation with DEP. These options would include ocean placement, nearshore placement, and in-channel placement.

III. DEP Sand Rule—Compliance During Construction

A. Environmental Protection Plan - The Contractor's *Environmental Protection Plan (EPP)* shall be submitted for review and acceptance by the USACE as required currently under Section 01355 (Environmental Protection) specification of the project. At the direction of the COR, this EPP may also address sediment quality assurance by including the training received by contractor designees to visually recognize placement materials not in compliance with the sand rule. A "short-course" on identification of beach quality sand may be offered by the Corps or a Corps designee to the Contractor to enable compliance with the sand rule.

B. Observations - In order to verify the character of sand within the placement area, the contractor and Corps of Engineers (COE) personnel shall continually observe the placement activities to ensure that the dredged material is acceptable for beach placement. These observations would be conducted on a daily basis and reported in the daily turbidity reports, which are submitted on a weekly basis. Material to be placed in the nearshore (turning basin material) has already been analyzed and will be monitored daily through the turbidity monitoring protocol.

C. Outcome and Action - If an observation by the Contractor or Corps representative reveals potentially non-compliant material being placed on the beach (i.e., significant visual difference between the sand indicated in the contract plans and specifications and the material being placed on the beach--including shell or other debris), the Contractor shall immediately notify the COR. Such observations of potential non-compliance shall also be recorded in the Daily Report of Operations (ENG Form No. 27A or ENG Form No.4267). The COR will respond as described in the project specifications, currently under sections 02325 (Dredging) and 01355 (Environmental Protection). Alternative techniques required for the removal of non-compliant material may also require a separate contracting action by the Corps. Sampling of potentially non-compliant material would be conducted as outlined above under “II C. Maintenance Dredging Material”. Material could also be considered non-compliant based on unacceptable silt content, which would be evident in the color of the material.

D. Dredge Position Monitoring (Dredge Location Control) – To ensure that the material being dredged is taking place within the channel limits and to protect environment resources outside of and adjacent to the channel, dredge position monitoring shall be required. The pertinent criteria for this requirement shall be addressed in the contract specifications under the section titled “Dredging”; refer to the sample criteria below.

IV. FDEP Sand Rule - Post-Construction Compliance

A. Methodology - Within 60 days of project completion, sand rule compliance observations shall be conducted by the Corps within the area that material was placed during the dredge event, the material will be sampled and analyzed regardless of sediment quality in accordance with the following:

B. The samples of fill shall be collected from representative locations within the placement area at approximately 1000’ intervals (sample locations will be recorded in field notes) and will utilize the same sampling techniques outlined above under “II C. Maintenance Dredging Material”. The material would be analyzed so that a sieve data sheet would be included when performing and reporting sieve analyses. This would include the following in tabular form: 1) sieve number, 2) diameter in mm, 3) diameter in phi units, 4) weight retained on sieve, 5) weight percent retained on sieve, 6) cumulative weight retained on sieve, 7) cumulative weight percent retained on sieve. All weights and percentages would be recorded to the nearest 0.01 gm. See additional information below:

C. Laboratory Analyses - Each sample will be characterized as to sand-type, moist color (Munsell), grain size distribution (sand grain frequency, median grain size, mean grain size, sorting coefficient), % shell, % fines (retained on #230 sieve), % fine gravel (retained on the #4 sieve), % coarse gravel, cobbles or material (retained on the 3/4 inch sieve). Sample granulometrics shall be quantified by performing a gradation analysis using nested sieves based upon ASTM D 422. Required U.S. Standard sieve sizes shall include 3/4”, 3/8”, 4, 7, 10, 14, 18, 25, 35, 45, 60, 80, 120, 170, 200, and 230.

D. Recording and Reporting Results - The results of each sample analysis shall be submitted as follows: (a) a tabular summary of % shell, % fines, % fine gravel, % coarse gravel, % cobbles or other material (retained on the 3/4 inch sieve), Munsell color (moist sample), and presence of construction debris or other foreign matter; (b) grain-size cumulative frequency distribution curve (a.k.a. gradation curve), and (c) tabular summary of nested sieve sample granularmetrics including mean grain size, median grain size, and sorting expressed as a numeric and verbal value. The sample submittal date to the laboratory shall be recorded by the laboratory on all reporting documents.

F. Outcome and Action – The information generated by the Corps from the examination of the post-construction sediment analytical data shall be submitted to DEP as verification of compliance with the Sand Rule within a reasonable period of time after collection.



FDEP “Sand Rule”

F.A.C. 62B-41.007

Design, Siting and Other Requirements.

(j) To protect the environmental functions of Florida’s beaches, only beach compatible fill shall be placed on the beach or in any associated dune system. Beach compatible fill is material that maintains the general character and functionality of the material occurring on the beach and in the adjacent dune and coastal system. Such material shall be predominately of carbonate, quartz or similar material with a particle size distribution ranging between 0.062mm (4.0Φ) and 4.76mm (-2.25Φ) (classified as sand by either the Unified Soils or the Wentworth classification), shall be similar in color and grain size distribution (sand grain frequency, mean and median grain size and sorting coefficient) to the material in the existing coastal system at the disposal site and shall not contain:

1. Greater than 5 percent, by weight, silt, clay or colloids passing the #230 sieve (4.0Φ);
2. Greater than 5 percent, by weight, fine gravel retained on the #4 sieve (-2.25Φ);
3. Coarse gravel, cobbles or material retained on the 3/4 inch sieve in a percentage or size greater than found on the native beach;
4. Construction debris, toxic material or other foreign matter; and
5. Not result in cementation of the beach.

If rocks or other non-specified materials appear on the surface of the filled beach in excess of 50% of background in any 10,000 square foot area, then surface rock should be removed from those areas. These areas shall also be tested for subsurface rock percentage and remediated as required. If the natural beach exceeds any of the limiting parameters listed above, then the fill material shall not exceed the naturally occurring level for that parameter.

(k) Pursuant to subsection 62B-41.005(15), F.A.C., sandy sediment derived from the maintenance of coastal navigation channels shall be deemed suitable for beach placement with up to 10% fine material passing the #230 sieve, provided that it meets the criteria contained in (j)2. through 5. above and water quality standards. If this material contains between 10% and 20% fine material passing the #230 sieve by weight, and it meets all other sediment and water quality standards, it shall be considered suitable for placement in the nearshore portion of the beach.

SAMPLE CRITERIA FOR DREDGE POSITION MONITORING

Dredge Location Control

The Contractor is required to have electronic positioning equipment that will locate the dredge when operating on the project. This equipment shall include real-time measurement of the water (tide) level. The Contractor is required to calibrate the equipment as required by the manufacturer or as required by the Contracting Officer. Proof of calibration shall be submitted to the Contracting Officer. Continuous locations of the dredge shall be made at all times during dredging, unloading, and transporting operations. The reason the dredge is outside the borrow area limits shall be annotated on the position chart and on the Contractor's Quality Control Report for each occurrence. The location of the dredge is to be by computed coordinates with a probable range error not to exceed 10 feet and furnished daily as part of the dredge reports, along with a real-time drawing of the track of the dredge in relation to the borrow area. Data collected while the dredge is in the vicinity of the borrow area, and at the pumpout location shall be plotted in chart form in 200-foot intervals with date and time. The charts shall show the track and draft of the dredge approaching, traversing, and leaving the work areas in question. Plotted charts shall be organized and maintained at a central work location for inspection on a daily basis by the Contracting Officer. Plotted charts shall be organized as directed, bound, and submitted weekly to the Contracting Officer for permanent file record. The Contractor's method of location of the dredge shall be submitted for review. LORAN-C shall not be permitted for location control. The Contractor is also required to have a depth of dredging indicator for each dragarm or cutterhead accurate to within one foot. The instrument used shall indicate the depth of dredging at all times and draghead depth when the dredge is outside the borrow area limits within 1-foot accuracy. For hopper dredges, the instrument may be a graph type paper or electronic recorder or an indicator which uses a pointer and scale. The reported elevation of dragarm and/or dredging shall be adjusted by the measured water level elevation and shall be reported relative to the datum indicated on the drawings and shall have a probable range error not to exceed 0.5 feet vertical. The paper or depth record produced by this instrument shall be submitted daily with the daily dredge report. The reason the dredge is outside the borrow area limits shall be annotated on the depth record and the draghead depth shall be highlighted. Flagging or marking the winch cables are not an acceptable option to fulfill this instrument requirement. The indicators shall be in plain view of drag tenders, quality control and Government inspectors.